

Functional Neural Relay Formation by Human Neural Stem Cell Grafting in Spinal Cord Injury

Grant Award Details

Functional Neural Relay Formation by Human Neural Stem Cell Grafting in Spinal Cord Injury

Grant Type: Early Translational III

Grant Number: TR3-05628

Project Objective: Project aims to use hESC (UCSF 4 line) derived NSC's to conduct POC studies in rats and then in NHP following T3 complete transection and T10 severe contusion injury models. to form a relay of axons formed by transplanted NSC's for functional gain following injury.

Investigator:

Name: Mark Tuszynski
Institution: University of California, San Diego
Type: PI

Name: Lawrence Goldstein
Institution: University of California, San Diego
Type: Co-PI

Disease Focus: Neurological Disorders, Spinal Cord Injury

Human Stem Cell Use: Embryonic Stem Cell

Award Value: \$4,600,447

Status: Closed

Progress Reports

Reporting Period: Year 1

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Reporting Period: Year 3

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Grant Application Details

Application Title: Functional Neural Relay Formation by Human Neural Stem Cell Grafting in Spinal Cord Injury

Public Abstract: We aim to develop a novel stem cell treatment for spinal cord injury (SCI) that is substantially more potent than previous stem cell treatments. By combining grafts of neural stem cells with scaffolds placed in injury sites, we have been able to optimize graft survival and filling of the injury site. Grafted cells extend long distance connections with the injured spinal cord above and below the lesion, while the host spinal cord also sends inputs to the neural stem cell implants. As a result, new functional relays are formed across the lesion site. These result in substantially greater functional improvement than previously reported in animal studies of stem cell treatment. Work proposed in this grant will identify the optimal human neural stem cells for preclinical development. Furthermore, in an unprecedented step in spinal cord injury research, we will test this treatment in appropriate preclinical models of SCI to provide the greatest degree of validation for human translation. Successful findings could lead to clinical trials of the most potent neural stem cell approach to date.

Statement of Benefit to California: Spinal cord injury (SCI) affects approximately 1.2 million people in the United States, and there are more than 11,000 new injuries per year. A large number of spinal cord injured individuals live in California, generating annual State costs in the billions of dollars. This research will examine a novel stem cell treatment for SCI that could result in functional improvement, greater independence and improved life styles for injured individuals. Results of animal testing of this approach to date demonstrate far greater functional benefits than previous stem cell therapies. We will generate neural stem cells from GMP-compatible human embryonic stem cells, then test them in the most clinically relevant animal models of SCI. These studies will be performed as a multi-center collaborative effort with several academic institutions throughout California. In addition, we will leverage expertise and resources currently in use for another CIRM-funded project for ALS, thereby conserving State resources. If successful, these studies will form the basis for clinical trials in a disease of great unmet medical need, spinal cord injury. Moreover, the development of this therapy would reduce costs for clinical care while bringing novel biomedical resources to the State.

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